SEMI P11-91
DETERMINATION OF TOTAL NORMALITY FOR ALKALINE DEVELOPER SOLUTIONS

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1 Scope

1.1 An acid-base potentiometric titration to single or multiple inflection points is performed on an automatic recording titrator using standardized hydrochloric acid as the titrant. The normality (meq/mL) is then calculated by the titrator using the data obtained.

2 Apparatus

2.1 Autotitrator

2.2 Glass combination electrode

2.3 Class A grade volumetric pipets in 1 to 25 mL sizes

2.4 250 mL beakers

3 Reagents

3.1 1.0 N Hydrochloric acid (from concentrate or ready to use 1.0 N).

3.2 *Primary Standard* — High-purity sodium carbonate is available from most chemical supply houses, but must be dried at 400 degree centigrade before use. TMAH (tris (hydroxymethyl) aminomethane) is also available from the National Institute of Standards and Technology (Standard Reference Material 723a) for this purpose.

3.3 Buffer solutions, pH 4.0, 7.0, 10.0.

4 Procedure

4.1 Standardize the 1.0 N Hydrochloric acid with the primary standard.

4.2 Standardize the titrator by performing a two-point calibration with pH 4.0, 7.0, and 10.0 buffer.

4.3 Pipette an appropriate aliquot (1 to 25 mL) of sample into a 250 mL beaker containing a magnetic stir bar. Sample size should be determined according to the expected normality and the amount of titrant to be dispensed that will give the optimum precision and accuracy. Generally, this is between one-half and three-quarters the capacity of the burette. (See the instrument manual for the recommended optimum range.)

4.4 Add deionized water to bring the volume to approximately 150 mL.

4.5 Without delay (to prevent carbon dioxide absorption), begin stirring without a vortex and titrate to beyond the inflection endpoint.

4.6 Determine the exact endpoint and record the volume of titrant consumed at the middle of the inflection endpoint. This will be done automatically on most newer digital titrators. On analog titrators, the inflection point can be determined by using the first derivative mode, or accurately determining the middle of the inflection.

5 Calculation

5.1 Calculate the normality of the sample by the following equation.

$$\text{Normality (N)} = \frac{\text{Volume of titrant (mL)} \times \text{Normality of titrant (N.HCL)}}{\text{Sample Volume (mL)}}$$

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